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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Application Number: 10/522,049
Filing Date: January 20, 2005
Appellant(s): BYUN ET AL.

MAILED
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Jack G. Abid
For Appellant -

EXAMINER'S ANSWER

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This is in response to the appeal brief filed July 5, 2007 appealing from the Office action mailed August 10, 2006.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

5,800,650	ANDERSON ET AL.	9-1998
2003/0064147	FUJII ET AL.	4-2003
JP 2002-179761	OSHIMI ET AL.	6-2002

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

(A)

Claims 1 and 5-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Anderson et al. 5,800,650 in view of Fuji et al. 2003/0064147.

Anderson et al. disclose a method of making a flexible multilayer printed circuit board comprising: providing laminates 35, 45 comprising a flexible substrate and conductive patterns 20, 22, 24, 26 (circuit boards), coating both sides of the circuit boards with a dielectric coverlayer 60, 62, 64, 66 to provide electrical insulation and environmental resistance, the coverlayers 62, 64 provided over the conductive patterns 22, 24 to provide external access to the contact pads of the conductive patterns at a number of predetermined points; providing an anisotropic adhesive 70 of conductive particles in a thermosetting polymer between the circuit boards to provide electrical connection between the circuit boards; and laminating the circuit boards under heat and pressure. Anderson et al. disclose that the insulative coverlayers are

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provided on the circuit boards to a thickness of at most 50 microns, most preferably at most about 5 microns, depending on the amount of dielectric protection needed for the particular application. Anderson et al. disclose providing the insulative coverlayer 60 completely over the conductive pattern 20 to protect the circuit boards from the external environment (thus on a plain portion and a side portion of circuit patterns and on a bottom portion of a circuit board, as claimed) while coverlayers 62, 64 which provide external access to the contact pads only partially cover the surface of the circuit patterns (col. 7-16). Anderson et al. disclose providing the coverlayers 62, 64 to provide external access to the conductive patterns by screen printing or coating a dielectric ink followed by cutting apertures in the coverlayers at desired points but does not specifically disclose providing the dielectric ink as an insulating resin solution.

Fuji et al. teach that in the manufacture of a flexible circuit board having a resin coverlayer having no voids, the cover layer is formed by providing a resin solution, wetting the surface of the circuit substrate with a solvent, and applying and drying the resin solution [0007]-[0018].

It would have been obvious to one of ordinary skill in the art to have modified the method of Anderson et al. by providing the dielectric ink for forming the insulative coverlayers as a resin solution applied to the flexible circuit board after wetting the circuit boards with solvent, as taught by Fuji et al., to provide insulative coverlayers having no voids. The use of a resin solution for printing or coating on the circuit boards to form the coverlayers would have been obvious to one of ordinary skill in the art, as taught by Fuji et al.

Providing the coverlayers of thickness in the range of either 0.1-5 microns or 0.3-3 microns, as claimed in Claims 5 and 6, would have been obvious to one of ordinary skill in the

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art, as Anderson et al. disclose that the coverlayers are most preferably of thickness of at most 5 microns, depending on the amount of dielectric protection needed for the particular application, thus suggesting to provide coverlayers of any thickness less than 5 microns as long as suitable dielectric protection is provided.

(B)

Claims 2-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Anderson et al. 5,800,650 in view of Fuji et al. 2003/0064147 as applied to claim 1, and further in view of JP 2002-179761.

Fuji et al. teach that the resin solution for forming a coverlayer of excellent insulation property can be provided by using a solution of resin or precursor of the resin, of resin such as epoxy resin [0018].

JP 2002-179761 (JP '761) teaches that an epoxy resin excellent in solvent solubility, excellent in heat resistance, moistureproofness and adhesiveness and useful as insulating material for circuit boards comprises an epoxy resin having a softening temperature of 63°C or more. JP '761 teaches providing epoxy resin of softening temperature of 71-85°C (Abstract and computer translation).

It would have been obvious to one of ordinary skill in the art to have modified the method of the references as combined by providing the resin solution as a solution of epoxy or precursor of epoxy, as taught by Fuji et al., as resin which provides a coverlayer of excellent insulation property, and to have provided the epoxy resin as a thermoplastic epoxy resin of softening temperature of at least 63°C, such as in the range of 71-85°C, as taught by JP '761, as epoxy resin excellent in solvent solubility, excellent in heat resistance, moistureproofness and

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adhesiveness and useful as insulating material for circuit boards. The use of a thermoplastic epoxy resin having a softening temperature in the range of 63-85°C, encompassed in the range as claimed in Claim 2 and overlapping the range as claimed in Claim 4, would have been obvious to one of ordinary skill in the art, as suggested by JP '761 as epoxy resin of excellent properties for use as insulating material for circuit boards, thus useful for providing the epoxy resin solution for forming an insulative coverlayer.

(10) Response to Argument

(A)

Appellant argues that the Examiner's combination of Anderson et al. and Fujii et al. is improper because the combination renders Anderson et al. unsatisfactory for its intended purpose. Appellant argues that Anderson et al. teach that the dielectric coverlayers are preferably selectively screen-printed over the conductive layers with a number of opening and apertures or alternatively, dielectric ink is applied across the entire surface with subsequent laser or chemical etching to create the needed openings. Appellant argues that the properties of the dielectric ink are critical to the operation of Anderson et al. and Anderson discloses no capability for the dielectric ink to be in the form of a resin. Appellant argues that the combination changes the principle of operation of Anderson et al. and produces a result which is inoperable because the heat-cured resin of Fujii et al. would be heated prior to the joining step and the conductive particles of Anderson et al. would not penetrate the resin. Appellant argues that one of ordinary skill in the art would be taught away from the combination due the characteristics of the resin of

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Fujii et al. and would not selectively seize the resin property of Fujii et al. while ignoring the fact that the actual resin taught would produce an inoperative result.

Anderson et al. disclose screen printing or coating a dielectric ink on flexible circuit boards to form the electrically insulative coverlayers. Anderson et al. disclose that the dielectric ink (insulative ink) for forming these coverlayers may be applied by screen-printing or other processes using a continuous roll-to-roll process such as barcoating and spraying. Anderson et al. also teach that the dielectric ink may be polyimide ink or other dielectric materials which readily form inks (col. 13, lines 26-49). After the ink is applied, it is dried and heat-cured (col. 13, lines 50-57). Thus in general, the insulative ink taught by Anderson et al. is in a liquid form and of a polymer (resin) that is heat-cured after application. As shown in Figures 2 and 3, insulative coverlayer 60 is formed to completely covers the conductive pattern 20 to protect the circuit boards from the external environment while coverlayers 62, 64 are formed to provide external access to the conductive pattern by only partially cover the surface of the circuit patterns of the circuit boards. Both coverlayer 60 and coverlayers 62, 64 can be considered to meet the claimed limitation of insulating resin "formed on a plain portion and a side portion of circuit patterns and on a bottom portion of a circuit board," because whether completely covering or partially covering the surface of a circuit pattern, resin formed on a plain portion of circuit patterns. The only issue is whether it would have been obvious to one of ordinary skill in the art to have provided the insulating ink for forming the insulative coverlayers as an insulating resin solution.

Fujii et al. teach a method of forming a coverlayer for a flexible circuit board and without voids in the coverlayer by forming the coverlayer applying a resin solution. According to

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Fujii et al., voids adversely influence the electric property and mechanical property of a flexible printed circuit (i.e. circuit board) and voids are avoided by first wetting the surface of the circuit board with solvent capable of dissolving the resin of the coverlayer then applying the coverlayer resin solution and drying the solution to form the coverlayer [0007]-[0010]. The Examiner's position is that it would have been obvious to one of ordinary skill in the art to have modified the method of Anderson et al. by providing the dielectric ink for forming the insulative coverlayers as a resin solution which is applied to the flexible circuit board after wetting the circuit board with solvent, as taught by Fuji et al., to provide insulative coverlayers. Clearly one of ordinary skill in the art would have been motivated to use the method as taught by Fujii et al. in order to suppress the occurrence of voids in the coverlayers which can adversely influence the electric property of the flexible circuit board.

With respect to the disclosure of Anderson et al. of screen printing selectively or across the entire surface, the reference is not limited to screen printing but discloses that other continuous processes can be used to apply the insulative coverlayer ink. Whether or not screen printing or other processes are used to apply the insulative ink, this is not a teaching against using a resin solution as the insulative ink. Both Anderson et al. and Fujii et al. teach using continuous processes for applying coverlayer resin.

Appellant argues that the properties of the dielectric ink are critical to the operation of Anderson et al., that Anderson et al. disclose no capability for the dielectric ink to be in the form of a resin and that the combination changes the principle of operation of Anderson et al. and produces a result which is inoperable because the actual heat-cured resin of Fujii et al. would be heated prior to the joining step and the conductive particles of Anderson et al. would not

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penetrate the resin. However, Anderson et al. disclose that the insulative coverlayer ink is either an ink of polyimide or other dielectric material and disclose that after the ink is applied, it is heat-cured prior to positioning an anisotropic conductive adhesive between circuit boards. Thus both Anderson et al. and Fujii et al. teach using a heat-cured resin for a coverlayer and the use of the methodology of Fujii et al. of using a resin solution would not make the method of Anderson et al. inoperable.

Even using the actual resin of Fujii et al. would not make the method of Anderson et al. inoperative because both Anderson et al. and Fujii et al. teach providing a coverlayer by using a resin which is to be heat-cured. Appellant's claimed step (e) of "heating the circuit boards" is met by the step in Anderson et al. of laminating the circuit boards under heat and pressure after providing an anisotropic adhesive between the circuit boards. This heating is to cure the anisotropic adhesive. In Anderson et al., the resin coverlayers have already been heat-cured before the laminating of the circuit boards.

Further, penetrating the heat-cured coverlayer with conductive particles, as argued, is not part of the method of Anderson et al. In the method of Anderson et al., coverlayers between circuit boards only cover the circuit patterns on a portion of the top (plain portion) and on their sides (side portions) and cover the circuit board so as to leave a portion of the circuit patterns exposed for contact with the conductive particles of the anisotropic adhesive. The conductive particles do not have to penetrate the heat-cured coverlayers to contact the circuit patterns.

With respect to dependent Claims 5-7, Appellant has presented no specific additional arguments as to the patentability of the limitations of Claims 5-7 over the prior art. The Examiner maintains that Claims 5-7 are unpatentable for the reasons as set forth in the rejection.

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(B)

Appellant argues that dependent Claims 2-4 recite further distinguishing features, also patentable over the prior art.

Appellant has presented no additional specific arguments as to the patentability of the limitations of Claims 2-4 over the prior art. The Examiner maintains that Claims 2-4 are unpatentable for the reasons as set forth in the rejection.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,



Melvin C. Mayes

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